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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/814,789	04/01/2004	Hyun-soo Park	1793.1150	4971

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EXAMINER	
BAYARD, EMMANUEL	
ART UNIT	**PAPER NUMBER**
2611	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/814,789	PARK ET AL.	
	Examiner	Art Unit	
	Emmanuel Bayard	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *31 October 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-22* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

This is in response to amendment filed on 10/31/07 in which claims 1-22 are pending and claims 23-25 are canceled. The applicant's amendments have been fully considered but they are moot based on the new ground of rejection. Therefore this case is made final.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-3 and 16-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ishii et al U.S. Patent No 5,973,749 in view of Melas U.S. Pub No 2002/0171961 .

As per claims 1 and 18 Ishii et al teaches an apparatus detecting binary data from an input signal read from an optical recording medium (see col.1, lines 30-32 and col.3, lines 23-25), the apparatus comprising: a first signal processor arranged to nonlinearly convert the input signal (see figs.14 and 17 elements 24c or 25k and col.10, lines 62-65 and col.11, lines 38-40) based on a result of comparing an absolute value of the input signal and a predetermined critical value (see figs. 14 and 17 elements 24a-24b or 25e-25h and col.10, lines52-65 and col.11, lines 5-12) generate a nonlinearly converted signal; and a second signal processor detecting circuit (see figs. 14 and 17 elements 25 or 25n and col.10, lines 40-43 and col.11, lines 52-55).

However Ishii et al does not teach a second signal processor detecting circuit detecting binary data from the nonlinearly converted signal.

Melas teaches a second signal processor detecting circuit detecting binary data from the nonlinearly converted signal (see fig.2 element 210 and page 3 paragraph [0034]).

It would have been obvious to one of ordinary skill in the art to implement the teaching of Melas into Ishii as to accurately recover the three level signals and remove inter-symbols interference in high density magnetic recording systems as taught by Melas (see page 3 paragraphs [0034-0036]).

As per claims 2 and 19 Ishii et al and Melas in combination would teach wherein the first signal processor saturates the input signal by the predetermined critical value when the absolute value of the input signal is larger than the predetermined critical value and outputs the input signal as the nonlinearly converted signal when the absolute value of the input signal is smaller than the predetermined critical value as to accurately recover the three level signals and remove inter-symbols interference in high density magnetic recording systems as taught by Melas (see page 3 paragraphs (see page 2 [0031-0032] and page 3 [0033]).

As per claims 3 and 20 , Ishii et al and Melas in combination would teach wherein the first signal processor is arranged to generate a difference of the absolute value of the input signal and the predetermined critical value as the nonlinearly converted signal when the absolute value of the input signal is larger than the predetermined critical value and the input signal is less than zero (0), and outputs to

generate -zero (0) as the nonlinearly converted signal when the absolute value of the input signal is smaller not greater than the predetermined critical value as to accurately recover the three level signals and remove inter-symbols interference in high density magnetic recording systems as taught by Melas (see page 3 paragraphs (see page 2 [0031-0032] and page 3 [0033]).

As per claim 16, Ishii et al and Melas in combination would teach wherein the second signal processor is a viterbi decoder and the viterbi decoder uses one of three methods, that is a PR (a,b,a) method, a PR (a,b,b,a,) method, and a PR (a,b,c,b,a) method as to accurately recover the three level signals and remove inter-symbols interference in high density magnetic recording systems as taught by Melas (see page 3 paragraphs (see page 2 [0031-0032] and page 3 [0033-0034]).

As per claim 17, Ishii et al and Melas in combination would teach, wherein the viterbi decoder uses an equalizer that adjusts the frequency characteristics of the input signal as to accurately recover the three level signals and remove inter-symbols interference in high density magnetic recording systems as taught by Melas (see page 2 [0029-0032]).

As per claim 21, Ishii et al and Melas in combination would teach wherein the converting the digital signal nonlinearly is executed via a digital filter (see fig having a nonlinear function according to the following equation: y=xx{I xI k}+k(-1)fixI~°}x{I xI ~ k} wherein I I indicates an absolute value, the braces and their contents become one if a conditional expression contained therein is true and zero if a conditional expression contained therein is false, x is the input signal, and k is a predetermined value ranging

from zero to a positive real number as to accurately recover the three level signals and remove inter-symbols interference in high density magnetic recording systems as taught by Melas (see page 2 [0031-0032] and page 3 [0033]).

As per claim 22, Ishii et al and Melas in combination would teach wherein the converting the input signal nonlinearly is executed via a digital filter having a nonlinear function according to the following equation: y=xx {I xI ~ k}+k (-1) fixI>°} x {I xI ~ k} wherein I I indicates the absolute value, the braces and their contents become one if the conditional expression contained therein is true and zero if the conditional expression contained therein is false, x is the input signal, and k is the predetermined critical value ranging from zero to a positive real number as to accurately recover the three level signals and remove inter-symbols interference in high density magnetic recording systems as taught by Melas (see page 2 [0031-0032] and page 3 [0033]).

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 4-15 and 21-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Melas U.S. Pub No 2002/0171961 A1 in view of Raz U.S. Patent no 6,639,537.

As per claims 4-6 and 21-22, Ishii et al and Melas in combination teach all the features of the claimed invention that yields the result of the following equation: y=xx{I xI k} wherein I I indicates an absolute value, the braces and their contents become one if a conditional expression contained therein is true and zero if a conditional expression contained therein is false, x is the input signal, and k is a predetermined value ranging from zero to a positive real number (see page 2 [0031-0032] and page 3 [0033]) except wherein the first signal processor includes a digital filter.

Raz teaches a first processor having a digital filter (see figs.4-5 element 116 and col.2 , lines 30-55 and col.4, lines 50-67).

It would have been obvious to one of ordinary skill in the art to implement the teaching of Raz into Ishii et al and Melas as to remove the non-linear distortions created by the analog front end as well as, those created by the ADC as taught by Raz (see col.2, lines 30-35)

As per claims 7-15, Raz teaches wherein the first signal processor comprises a finite impulse response (FIR) filter in front of the digital filter, (see figs.4-5 element 116 and col.2, lines 30-55 and col.5, lines 63-67) arranged to change frequency characteristics of the input signal. Furthermore implementing such teaching ; and a nonlinear filter arranged to generate the nonlinearly converted signal based on the absolute value of the input signal and the predetermined critical value of Ishii et al and Melas would have been obvious to one skilled in the art as to remove the non-linear distortions created by the analog front end as well as, those created by the ADC as taught by Raz (see col.2, lines 30-35).

Conclusion

3. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

4. Abarbanel et U.S. Patent No 6,310,906 B1 teaches chaotic carrier.

5. Norsworrthy et al U.S. Patent No 5,745,061 teaches method of improving the stability.

6. Miki et al U.S. Patent No 6,094,233 teach a video signal.

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Emmanuel Bayard whose telephone number is 571 272

3016. The examiner can normally be reached on Monday-Friday (7:Am-4:30PM) Alternate Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chieh Fan can be reached on 571 272 3042. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

1/18/2008

Emmanuel Bayard
Primary Examiner

EMMANUEL BAYARD
PRIMARY EXAMINER
ART UNIT 2611